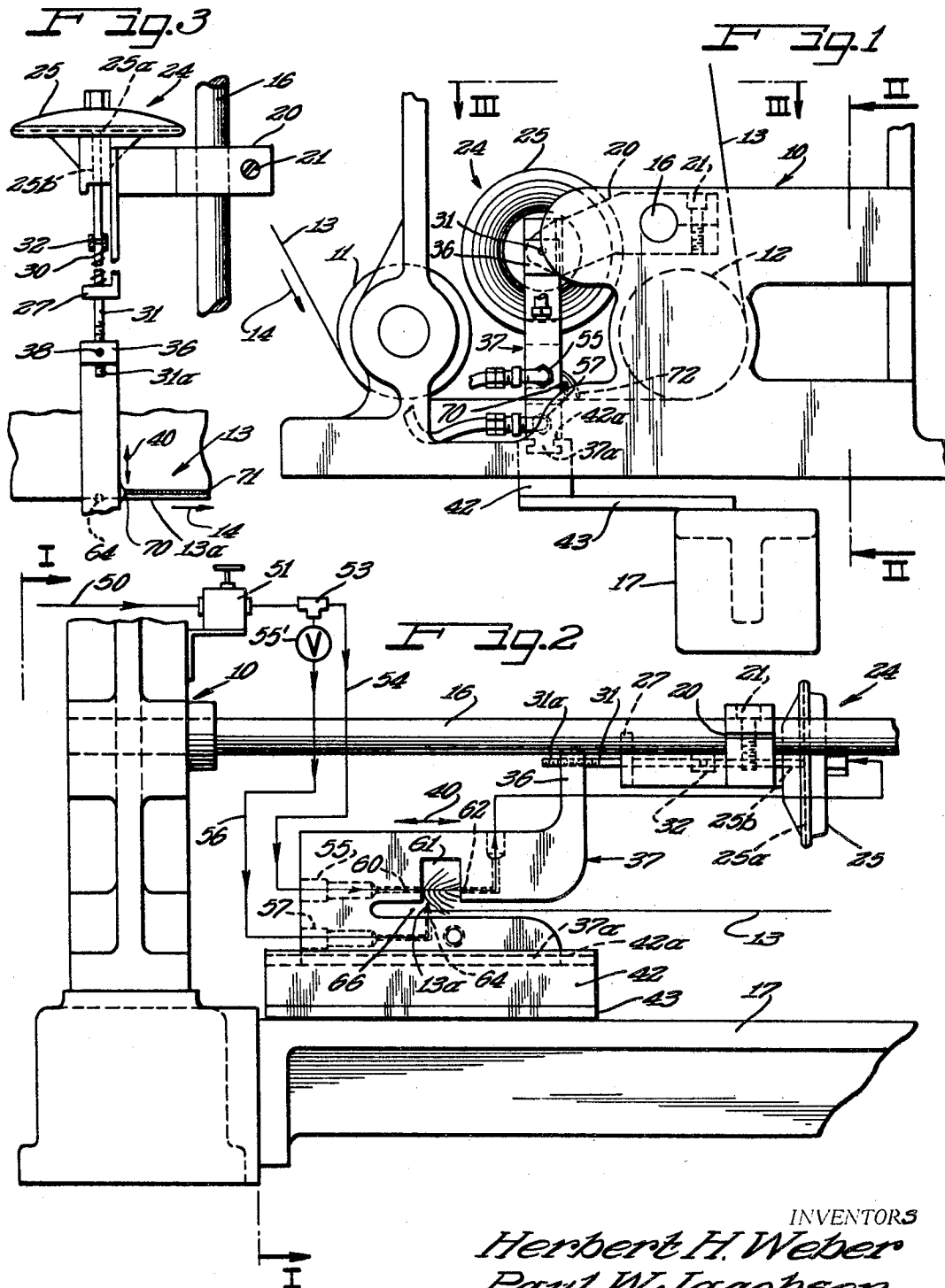


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PILOT FOR GLUE DETECTOR PROBE AND FOR LOCATING GLUE LINE  
ON A MOVING AND WEAVING WEB  
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## PILOT FOR GLUE DETECTOR PROBE AND FOR LOCATING GLUE LINE ON A MOVING AND WEAVING WEB

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### ABSTRACT OF THE DISCLOSURE

Device for sensing the edge of a traveling web and locating a glue line on the web parallel to the edge of the web. The sensing device extends over and under the web and is mounted for movement transversely of the web. A fluid orifice in the sensing device is located to one side of the edge of the web and directs a control jet perpendicular to the plane of the web. This jet is intercepted by the web, when the web is misaligned. A working jet is also carried by the sensing device and directs a jet parallel to the plane of the web across a gap formed in the sensing device and opening toward the control jet. The working jet is connected with an actuator downstream of the gap, to supply pressure to operate the actuator to maintain the sensing device in alignment with the edge of the gap. The working jet is of a much higher pressure than the control jet. As the control jet impinges on the working jet, the pressure to the actuator will be reduced and an equilibrium will be maintained to maintain the sensing device in position. As, however, the control jet is intercepted by the web, the pressure supplied to the actuator will be increased and cause the sensing device to position the control jet to again intercept the working jet and bring the actuator into equilibrium. The sensing device carries a glue nozzle applying a line of glue to the web. A glue detector probe is also carried by the sensing device to detect the glue and to provide a signal in the event a break should occur in the glue line.

### Objects of invention

It is an object of the present invention to provide a control system for causing a web treating element such as a glue extrusion tube to follow the edge of a moving web more accurately and precisely than has heretofore been possible.

It is another object of the present invention to provide a system for laying an extruded glue line or the like along the edge of a moving and weaving web with increased accuracy so as to realize a substantial saving by reducing waste at the edge of the web.

Another object of the invention is to provide a novel edge sensing system.

Other objects, features and advantages of the present invention will be apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a somewhat diagrammatic vertical sectional view taken generally along the line I—I of FIG. 2;

FIG. 2 is a somewhat diagrammatic transverse sectional view taken generally along the line II—II of FIG. 1; and

FIG. 3 is a diagrammatic horizontal sectional view

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taken generally along the line III—III of FIG. 1 and indicating diagrammatically a means for laying an extruded glue line and a glue break detector probe mounted for joint movement with the edge sensing device.

Referring to FIG. 1, the reference numeral 10 designates any suitable web guiding means which includes guide rollers 11 and 12 receiving a moving web 13 which may, for example, be moving in the direction of arrow 14. For the purposes of the present invention, the framework 10 provides a rigid support for a mounting shaft 16 and for a mounting bar 17.

As best seen in FIG. 1, a mounting bracket 20 is clamped to mounting shaft 16 at any desired location along the length of the shaft by means of a screw indicated at 21. The bracket 20 in turn mounts an actuator assembly 24 which in the illustrated embodiment includes a diaphragm type actuator 25 having a flexible or resilient diaphragm such as indicated at 25a which is clamped at its outer perimeter to the case of the actuator and is connected at its central movable portion to an actuating rod such as indicated at 25b. The actuating rod 25b is guided for axial movement, for example by means of a guide element 27 secured to the clamp bracket 20, the clamp bracket 20 also mounting the diaphragm actuator 25.

A coil compression spring 30 encircles the actuating rod 25b or an extension thereof as indicated at 31 and is interposed between a face of the guide element 27 and a connector element 32 which rigidly connects rod parts 25b and 31.

The free end 31a of the extension rod 31 is secured to an upstanding leg 36 of an edge sensing device 37. A set screw is indicated at 38 for fixedly securing the leg 36 to the extension rod 31. The edge sensing device 37 is guided for lateral movement as indicated by the double headed arrow 40 in FIG. 2 by means of a fixed guide way 42 secured to a mounting plate 43 which in turn is secured to the mounting bar 17. The guide way 42 is provided with inturned flanges such as indicated at 42a, and the edge sensing device 37 is provided with a base portion 37a of configuration which is complementary to the guide way 42.

An air pressure actuated circuit is preferably utilized for controlling the air pressure in the right hand chamber of the diaphragm actuator 25 so as to control the position of the edge sensing device 37 along the guide way 42. Air under pressure for example a plant air pressure source is supplied to line 50, FIG. 2 leading to an adjustable pressure regulator device 51. The output of the pressure regulator 51 is supplied to a T 53 with one line 54 leading to a passage 55 of the edge sensing device and with a second output from the T 53 leading through a manually adjustable needle valve component 55' and a line 56 to a passage 57 in the device 37. The passage 55 leads to a power discharge orifice 60 discharging at an interior space 61 of the device 37 and toward a receiving orifice as indicated at 62. The passage 57 leads to a control discharge orifice 64 which directs a control jet transversely to the power jet emitted by orifice 60. The control jet 74 is directed through an edge receiving zone 66 of the sensing device 37 so that the control jet is normally partially intercepted by the edge of web 13 to establish and define an equilibrium or balance condition of the system. In the equilibrium condition, a portion of the control

jet impinges on the power jet deflecting a portion of the power jet from the receiving orifice 62 to establish a somewhat reduced pressure in the actuating chamber at the right hand side of diaphragm 25a. Under this condition, there is a balance between the pressure in the diaphragm chamber and the force exerted by the compression spring 30.

In travel of the web 13 pass the sensing device 37, the web 13 will weave in the lateral direction, and the system is arranged so that the edge sensing device 37 will be shifted by the actuating system 24 so as to maintain an essentially constant positional relationship of the edge sensing device 37 relative to the edge 13a of the web 13. Specifically as illustrated in FIG. 3, the control orifice 64 will be maintained essentially in registration with the edge 13a regardless of any weaving of the web in its travel past the edge sensing device 37.

For example, if the web 13 shifts to the left from the position shown in FIG. 2, the intensity of the control jet impinging on the power jet will be reduced thus increasing the pressure in the diaphragm actuating chamber and shifting the rod 31 and the sensing device 37 to the left until the equilibrium condition is restored. Similarly, if the web 13 should shift to the right, the intensity of the control jet impinging on the power jet would increase, increasing the turbulence in the space 61 and diminishing the pressure in the diaphragm actuating chamber, allowing the compression spring 30 to shift the rod 31 and the sensing device 37 to the right as viewed in FIG. 2.

In the specific embodiment herein illustrated, it is contemplated that a glue extrusion tube as indicated at 70 will be secured to the edge sensing device 37 so as to deposit a glue line as indicated at 71 along a region of the web 13 which is closely adjacent the edge 13a. Because the edge sensing device 37 is arranged to accurately follow any shifts in the position of the edge of the web, the glue line 71 may be deposited in a uniform manner closely adjacent to the edge 13a so as to minimize waste of web material. Reference numeral 72 is a diagrammatic illustration of a glue detector probe which may closely track the glue extrusion tube and provide a signal in the event that a break should occur in the glue line 71.

By way of example, needle valve 55 may be adjusted so that the high pressure power or working jet emitted by orifice 60 is about ten times as strong as the low pressure control jet emitted from orifice 64. Since the high pressure jet does not impinge directly on the edge of the web 13, it is possible to provide sufficient power for directly operating actuator 24 without interposing any active type of amplifier between the receiving orifice 62 and the simple actuator device 25. Thus, the actuator 24 need not include any active power amplification component. The sensing device 37 has a very high rate of response and can follow web run-out very accurately no matter how much the web weaves back and forth. The sensing device 37 is non-plugging because the high pressure working jet does not even come near the edge of the web to pick up lint and dust. The low pressure control jet is aimed only at right angles to the high pressure working jet and at right angles to the receiving orifice 62 so that if any lint is picked up from the control jet, it will simply be thrown out as the high pressure jet transfers from laminar flow to turbulent flow.

This accurate web edge pilot or tracer system allows the glue line 71 to be placed much nearer the edge of the web without running off of the web or running too far in from the edge of the web, permitting a substantial savings in overall web width.

It will be understood that the edge sensing device 37 may be mounted for lateral movement or to transmit lateral movement to the treatment element 70 by any suitable means. For example, the sensing device 37 could be mounted by means of one or more pivotal arms or links for movement in the transverse direction. The control

orifice means 64 may be elongated in the transverse direction corresponding to the direction of double headed arrow 40, or two or more control jets may be provided offset somewhat with respect to the lateral direction. Many other modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. An apparatus for controlling a web treating element and causing the element to follow lateral movements of an edge of the web comprising,

an actuator having an input and an output shiftable in response to an input signal supplied to said actuator input,

an edge sensing device having an edge sensing zone for receiving an edge portion of a moving web and having

a fluid orifice located to one side of the web and directing a control jet in a direction perpendicular to the plane of the web and intercepted by the web when out of alignment,

means for coupling said edge sensing device to said output of said actuator so that the position of said device is controlled by said actuator,

a second fluid orifice in said edge sensing device directing a working jet in a plane parallel to the web and intercepted by said control jet and connected with the input of said actuator, such that an error signal from the device results in a shifting of the actuator output in a direction tending to reduce the error in web position, and causing said edge sensing device to maintain a predetermined position relative to the edge of the web, and

a web treating element connected to the edge sensing device for treating the edge of the web and maintained in a predetermined position relative to the edge of the web in spite of any variations in the position of the edge of the web, as the web moves through the sensing zone.

2. The apparatus of claim 1, wherein the web treating element is a glue line applying element, for applying a glue line closely adjacent and parallel to the edge of the web.

3. The apparatus of claim 2, wherein a glue detector probe is carried by the edge sensing device for tracking the glue line applying element and following the glue line despite weaving of the web as it travels through the sensing device for detecting a break in the glue line.

4. The apparatus of claim 1,

wherein the edge sensing device has a gap therein opening toward the web,

wherein the input to the actuator is connected to the web sensing device downstream of said gap, and

wherein the control jet is directed by its fluid orifice to impinge fluid into said gap onto the working jet passing across said gap when the actuator is in equilibrium.

5. The apparatus of claim 4, in which the pressure of the working jet is of the order of ten times the pressure of the control jet.

6. An edge sensing system comprising an edge sensing device having

an edge sensing zone for receiving an edge of a moving web,

means for producing a working jet adjacent to but displaced from said edge sensing zone and in a direction parallel to the plane of the moving web, and

means providing a control jet directed through said edge sensing zone perpendicular to the plane of the web toward said working jet for impingement on the working jet at a pressure determined by the position of the edge of the web relative to said control jet, and actuator means operated by variations in pressure of said working jet downstream of the region of impingement of the control jet on the working jet, to main-

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tain the control jet in predetermined relation with respect to the edge of the web.

7. The edge sensing device of claim 6, in which the working jet has a pressure in the order of ten times the pressure of the control jet, in which the sensing device has a gap therein in direct alignment with control jet and across which the working jet flows and, in which the means operated by variations in pressure of the working jet is connected with said working jet downstream of said gap.

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